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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/732,777	12/10/2003	Gottfried Rainer Dohle	78323CIP1 (P1261G US CIP)	6984
27975	7590	09/19/2005	EXAMINER	
ALLEN, DYER, DOPPELT, MILBRATH & GILCHRIST P.A. 1401 CITRUS CENTER 255 SOUTH ORANGE AVENUE P.O. BOX 3791 ORLANDO, FL 32802-3791			LEE, EUGENE	
			ART UNIT	PAPER NUMBER
			2815	

DATE MAILED: 09/19/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/732,777

Applicant(s)

DOHLE ET AL.

Examiner

Eugene Lee

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 27 June 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-9 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-9 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Claim Objections*

1. Claim 9 is objected to because of the following informalities: the word "first" is misspelled in line 5 of said claim. Appropriate correction is required.

### *Claim Rejections - 35 USC § 103*

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1 thru 4, 8, and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nyul 3,622,906 in view of Saint-Cyr 4,879,589. Nyul discloses (see, for example, FIG. 3) a diode (device) D1 comprising a P- region (P side), N-region (N side), and planar metallized contact layer (planar contact structure) 52/54. Nyul does not disclose a first subcomponent comprised of a layer of a first material having a first CTE; and a second subcomponent comprised of a layer of a second material having a second CTE plated on each of opposing surfaces of the first subcomponent. However, Saint-Cyr discloses (see, for example, FIG. 3) a semiconductor device comprising a contact (contact structure) 21 wherein the contact comprises a strip of molybdenum (first subcomponent) 23, and copper sheets (second subcomponent) 24, 25. In column 3, lines 10-13, Saint-Cyr discloses the contact structure having a coefficient of thermal expansion sufficiently well matched to the silicon diode chips provides stress relief in all dimensions. Therefore, it would have been obvious to one of ordinary skill in the art at the time

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of invention to have a first subcomponent comprised of a layer of a first material having a first CTE; and a second subcomponent comprised of a layer of a second material having a second CTE plated on each of opposing surfaces of the first subcomponent in order to provide stress relief in all dimensions.

Regarding claim 2, see, for example, Fig. 3 wherein Nyul discloses a device comprising a plurality of diodes (plurality of semiconductor components) D1-D4 affixed to a wafer (common substrate) 12, and a plurality of contact layers (contact structures) 52.

Regarding claim 3, Nyul does not disclose the affixing means being a hard solder. However, Saint-Cyr discloses (see, for example, FIG. 2c) a solder preform (hard solder) 28 attached the contact 21 to a diode chip 13. It would have been obvious to one of ordinary skill in the art at the time of invention to have the affixing means being a hard solder in order to reliably attach the contact to the diode.

Regarding claim 4, Nyul in view of Saint-Cyr does not disclose the second subcomponent having a thickness on each opposing surface that is within a range from about one-twentieth to about one-fifth of the contact structure thickness. However, it was well within the skills of an artisan in the art to optimize the performance of a second component by adjusting the thickness in order to provide a reliable contact structure, which avoids delamination, and assures an ohmic contact with a device. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention was made to have the second subcomponent having a thickness on each opposing surface that is within a range from about one-twentieth to about one-fifth of the contact structure thickness because it was well within the skills of an artisan to optimize the performance of a second component by adjusting its thickness in order to provide a reliable contact structure

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which avoids delamination, and assures an ohmic contact with a device. See *In re Aller*, 105 USPQ 233.

Regarding claim 8, and the limitation “the contact structure is affixed to the N-side”, see, for example, Fig. 3 wherein Nyul discloses the contact 54 being affixed to the N-region (N-side).

Regarding claim 9, Nyul in view of Saint-Cyr does not disclose the first and second subcomponents having an overall thickness selected such that the contact structure has an effective electrical resistive constant that is optimized intermediate to the electrical resistive constant of the first and second subcomponents. However, it was well within the skills of an artisan in the art to optimize the performance of the first and second subcomponents by adjusting the thickness in order to provide a reliable contact structure which avoids delamination, and whose thermal expansion properties are matched with a diode. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention was made to have the first and second subcomponents having an overall thickness selected such that the contact structure has an effective electrical resistive constant that is optimized intermediate to the electrical resistive constant of the first and second subcomponents because it was well within the skills of an artisan to optimize the performance of the first and second subcomponents by adjusting its thickness in order to provide a reliable contact structure which avoids delamination, and whose thermal expansion properties are matched with a diode. See *In re Aller*, 105 USPQ 233.

4. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nyul ‘906 in view of Saint-Cyr ‘589 as applied to claims 1-4, 8, and 9 above, and further in view of Spaeth 5,812,570. Nyul in view of Saint-Cyr does not disclose the hard solder being a gold-tin solder.

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However, Spaeth discloses (see, for example, column 4, line 4) an adhesive made of AuSn alloy (gold-tin solder). It would have been obvious to one of ordinary skill in the art at the time of invention to have the hard solder being a gold-tin solder because it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice (In re Leshin, 125 USPQ 416) in order to adhere two structures in a semiconductor device together.

5. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nyul '906 in view of Saint-Cyr '589 as applied to claims 1-4, 8, and 9 above, and further in view of Basol 4,666,569. Nyul in view of Saint-Cyr does not disclose the second material being silver. However, Basol discloses (see, for example, column 3, lines 52-65) a semiconductor device comprising a copper layer and an overlying second metal layer (second material). The second metal layer may comprise silver and provides a stable, intimate contact with the copper layer. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to have the second material being silver because it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice (In re Leshin, 125 USPQ 416) in order to provide a stable, intimate contact with the copper layer.

6. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nyul '906 in view of Saint-Cyr '589 in view of Basol '569 as applied to claim 6 above, and further in view of Spaeth 5,812,570. Nyul in view of Saint-Cyr in view of Basol does not disclose the hard solder

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being a gold-tin solder. However, Spaeth discloses (see, for example, column 4, line 4) an adhesive made of AuSn alloy (gold-tin solder). It would have been obvious to one of ordinary skill in the art at the time of invention to have the hard solder being a gold-tin solder because it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice (In re Leshin, 125 USPQ 416) in order to adhere two structures in a semiconductor device together.

### ***Response to Arguments***

7. Applicant's arguments with respect to claims 1-9 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

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however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

### **INFORMATION ON HOW TO CONTACT THE USPTO**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eugene Lee whose telephone number is 571-272-1733. The examiner can normally be reached on M-F 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on 571-272-1664. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Eugene Lee  
September 9, 2005

A handwritten signature in black ink, appearing to be 'E. Lee', written in a cursive style.